the denticles, the segmented character of the fossils, and the fact that the segments are found singly, and of different sizes, which would indicate that they are shed like teeth, together with the presence of a slender curved basal bone (similar to that in Onychodus of the Devonian of Ohio) in the Australian form described by Dr. Woodward, led the author to think that these fossils are neither dorsal spines nor pectoral fins, but intermandibular teeth, which had a membranous or cartilaginous support in the American forms, and an osseous support in the Australian. These supports would bear the same relation to the mandibular arch that the glosso-hyal does to the hyoid arch.—*Fanny R. M. Hitchcock.*

MINERALOGY AND PETROGRAPHY.[1]

Petrographical News.—In the continuation[2] of his work on the rocks collected by the "Challenger" expedition, Renard has reached the discussion of the geology of the islands in the Indian Ocean. Those situated in the meridional part of the ocean are divided into five groups, three of which have been examined in detail. They are all of volcanic origin, and are in no way connected with Madagascar or the land within the Antarctic circle. The island *Marion*[3] is formed of volcanic rocks of two distinct ages, readily distinguishable by differences in the character of the vegetation they support. They both consist of feldspathic basalts, with anorthite as the plagioclastic constituent. The rocks of the island *Heard* are very similar to those of *Marion*. In the neighborhood of Corinthian Bay the prevailing rock is a feldspathic basalt, in which Baveno twins of bytownite are crowded together in groups. Many of these are optically anomalous in their action between crossed nicols, a fact supposed by Renard to be due to their fine lamellation. The olivine shows cleavages parallel to oP and a pinacoid. In some cases it has suffered alteration into pilite. In addition to the basalts a few specimens of limburgite were also collected.——The same author has recently studied the rocks of Kerquellen Land,[4] which had already been examined to some extent by J. Roth.[5] Renard finds that these rocks consist principally of basalts, with amygdules of analcite and zeolites. The grains of olivine in them are grouped together like the chondra of meteoric stones. In addition to the basalts there occur on the island trachites, limburgite, and phonolites. Of these the trachytes and phonolites are older than the basalts.——Two late articles on the petrography of the Tyrol add several interesting facts to our knowledge of this re-

[1] Edited by Dr. W. S. BAYLEY, Madison, Wisconsin.
[2] American Naturalist, Notes, 1886, p. 640.
[3] Bull. d. l. Soc. Roy. de Belg., 1886, iii. p. 245.
[4] Bul. du Mus. Roy. d'Hist. Nat. de Belg., iv. p. 223.
[5] Monatsb. d. Kön. Akad. Berlin, 1875, p. 723.

gion. Baron von Foullon[1] separates the porphyrites of the Tyrol into quartz-porphyrites, quartz-mica-porphyrites, and diabase-porphyrites. In connection with the first group, Von Foullon records the replacement of hornblende by augite near the contact of the quartz-porphyrite and granite. The second group is characterized by the presence of garnet and an epidote, with the unusual pleochroism wine-yellow and violet. Intergrowths of this mineral and hornblende take place in such a manner that the axes $\bar{b}$ and c' of the former are parallel with c' and $\bar{b}$ of the latter. The hornblende in the rock often shows a parting parallel to oP. ——In the *Neues Jahrbuch* Cathrein[2] describes six rocks from various localities in the Alps. A staurolite-mica-schist occurs at Oberinnthal. It contains numerous hemimorphic crystals of tourmaline. A garnet amphibolite is remarkable for the occurrence in it of plagioclase pseudomorphs of garnet. The interior of the garnets are changed into plagioclase, around which is an exterior zone of compact hornblende. The serpentine of this region is an altered pyroxene rock. The remains of bronzite, enstatite, and diallage can still be detected in it. The most instructive portion of the paper is that devoted to the porphyrites and pitchstone-porphyries. Of the former several varieties are recognized. The first contains epidotized plagioclase and crystals of compact hornblende. In the second, in which uralite and a little augite occur instead of hornblende, the plagioclase is sausuritized. A third variety contains brown garnets in oscillatory combinations of the dodecahedron and the icositetrahedron. They are the oldest constituent. Of the pitchstone-porphyry the author says, this rock occurs in large independent masses, breaking through the prevailing quartz-porphyry in large dikes and bosses, no transition between the two being anywhere discernible.——A schistose rock from the Grossarlthal in the Alps contains chloritoid instead of mica as its bisilicate constituent. Cathrein[3] calls it a chloritoid schist. It contains nearly five per cent. of rutile and sphene.——The rocks of the Hereroland in Southwest Africa belong principally to the class of the older eruptives.[4] The quartz grains of some of the granites contain fluid inclusions with hexahedral crystals, and are pierced through by little needles of sillimanite. The most interesting observations are those on the crystalline schists. The gneiss is remarkable for the unusual association and decomposition of its constituents. The biotite is intergrown with sillimanite, and contains zircon crystals surrounded by pleochroic "*höfe*." Orthoclase and microcline are intergrown in the manner described by Becke.[5] The former has

[1] Jahrb. d. k. k. geol. Reichsaust, 1886, p. 747.
[2] Neues Jahrb. f. Min., etc., 1887, i. p. 147.
[3] Min. u. Petrog. Mitth., viii., 1887, p. 331.
[4] H. Wulf, Min. u. Petrog. Mitth., viii., 1887, p. 193.
[5] *Cf.* Min. u. Petrog. Mitth., iv., Taf. ii. Fig. 8.

undergone alteration into pseudophite, yielding a product having very much the appearance of serpentinized olivine. The augite gneisses are divided into scapolite-bearing varieties and those that contain wallastonite. The cleavage in the scapolite, as observed by Wulf, is parallel to ∞P, and is not parallel to $\infty P\infty$, as given in the text-books. The latter is probably a parting. The composition of the augite in both varieties approaches that of diopside. Other rocks described by Wulf are diorites, basalts, amphibolites, diorite-schists, mica-schists, etc.——Lacroix describes a gabbro from St. Clement in the Puy-de-Dôme, which contains, in addition to the usual constituents, the minerals vesuvianite, sphene, and wallastonite. The feldspar is anorthite with only 0.53 per cent. of Na_2O. It presents the appearance of having been crushed and recemented, the cementing material possessing the same optical orientation as the pieces it surrounds.

Mineralogical News.—Within the past few months the properties of quite a number of rare minerals have been investigated by mineralogists in this country and in Europe, with the results indicated below. W. C. Brögger[1] describes in detail the characteristics of *låvenite* and *cappelinite*. The former occurs on the island Låven in Langesundsfjord, and is also found in the eleolite syenite[2] of the Province of Rio Janeiro, Brazil. It forms brown to yellow, slightly transparent crystals, with a prismatic habit and vitreous lustre. It is monoclinic in crystallization with $\grave{a} : \bar{b} : c' = 1.0811 : 1 : 0.8133$, $\beta = 71^\circ\ 24\frac{1}{2}'$. The twinning and the cleavage planes are parallel to the orthopinacoid, while the plane of the optical axes is the clinopinacoid. The mineral is strongly pleochroic, $\mathfrak{c} > \mathfrak{b} > \mathfrak{a}$ = red-brown, yellowish-green, and wine-yellow. Its specific gravity is 3.51, and its composition:

SiO_2	ZrO_2	Fe_2O_3 (?)	MnO	CaO	Na_2O	Loss at red heat
33.71	31.65	5.64	5.06	11.00	11.32	1.03

Cappelinite is found in a small vein in the augite syenite of Little Arö in Langesundsfjord. It occurs in thick brown hexagonal prismatic crystals with a fatty lustre. Their axial ration is 1 : 0.4301. Their analysis yielded:

SiO_2	B_2O_3	Y_2O_3	$La(Di)_2O_3$	Ce_2O_3	ThO_2	BaO	CaO	Na_2O	K_2O	H_2O
14.16	17.13	52.55	2.97	1.23	0.79	8.15	0.61	0.39	0.21	1.81

Warwickite, the borotitanate of magnesium and iron, occurring at Edenville, N. Y., is generally found in prismatic crystals elongated in the direction of the vertical axis, with a cleavage parallel to the clinopinacoid. Lacroix[3] has succeeded in obtaining measurements of these, which indicate a symmetry corresponding to that of the rhombic system. In accordance with

[1] Zeitsch. f. Kryst., x., 1885, p. 503, and Geol. För. i. Stockh. Förh., Bd. vii. p. 598.

[2] Fr. Graeff, N. J. B., 1887, i. p. 201.

[3] Bul. d. l. Soc. Fr. du Min., ix. p. 74.

this view the plane of their optical axes is the orthopinacoid. Their bisectrix is positive and perpendicular to $\infty P\grave{\infty}$. $2E = 125°$. The mineral is pleochroic in red and brown tints. *Withamite* from the porphyrites of Glencoe, County Argyle, Scotland, the same author regards[1] simply as epidote. He also thinks[2] that *mismondine*, *sasonite*, *ottrelite*, *venasquite*, and *phyllite* are merely varieties of chloritoid, the optical properties of which he describes at length. *Xantholite* he supposed[3] to be identical with staurolite.——J. Strüver[4] does not consider *gastaldite* as a variety of glaucophane, but regards both minerals as distinct members of the amphibole group.——According to Lacroix[5] the *kirwanite* (of Thomson) is a mixture of amphibole, secondary quartz, and epidote. The same author[6] finds that *hullite* from Belfast is not homogeneous, and therefore should not be regarded as a definite mineral species. He states also that Dufrenoy's *dréelite* is an impure barite.——New analyses of *agalmatolite*[7] indicate that most of the substance to which this name has been given really possesses no definite composition, but is probably a mixture of silica and hydrated silicates of potassium and aluminium, resulting from the decomposition of orthoclase.——An apparently regular mineral has been found by Vom Rath[8] in the druses of an andesite near the apex of Cerro S. Cristobal near Pachuca, Mexico. It occurs in small octahedra, sometimes twinned according to the spinel law. It is often intergrown with tridymite. Hardness = 6–7. Specific gravity = 2.27. Its composition is $SiO_2 = 91$ per cent. $Fe_2O_3.Al_2O_3 = 6.2$ per cent. Both Vom Rath and Bauer regard it as most probably regularly crystallizing silica. It has been called *christobalite* to distinguish it from quartz, tridymite, vestan (Jensch, *Pog. Ann.*, 1858, p. 320), and asmanite.——A new variety of dufrenite has been observed by Messrs. Kinch, Butler,[9] and Miers in Cornwall, England. When fresh it is found in small black or apple-green orthorhombic plates, which in the thin section appear yellow or brown. Its hardness is 4.5 and specific gravity 3.233. An analysis yielded:

H_2O	CuO	P_2O_5	Fe_2O_3	CaO
10.68	0.96	30.42	55.93	1.51

The composition of the mineral corresponds with that of Streng's *kraurite*.[10]——The composition of a micaceous mineral from a limestone in the Kaiserstuhl is recorded by Knop[11] as follows:

SiO_2	TiO_2	Al_2O_3	Fe_2O_3	Mn_2O_3	MgO	K_2O	H_2O
35.91	1.15	15.18	10.85	0.89	22.80	2.90	10.77

[1] Bul. d. l. Soc. Fr. du Min., ix. p. 75.
[2] Ib., p. 76. [3] Ib., p. 78.
[4] Neues Jahrb. f. Min., etc., 1887, i. p. 217.
[5] Bul. d. l. Soc. Min. d. Fr., viii., 1885, p. 428. [6] Ib., p. 435.
[7] Min. Mag., July, 1886, pp. 24 and 29; Dec. 1886, p. 74.
[8] Neues Jahrb. f. Min., etc., 1887, i. p. 198.
[9] Min. Mag., Dec. 1886, p. 65.
[10] Neues Jahrb. f. Min., 1881, i. p. 101. [11] Zeits. f. Kryst., xii. p. 607.

This mineral differs from biotite in the possession of water and a smaller percentage of potassium. As Hoppe-Seyler[1] found that when biotite is subjected to the action of carbon dioxide and water it loses potassium and gains water, Knop thinks that this mineral, which he calls *pseudobiotite*, may have been formed in the same way, especially as it is found most abundantly near the contact of limestone with phonolite. Knop further discusses[2] the constitution of biotite, but reaches no conclusions further than that the atomic relations of its constituents are $SiO_2 : R_2O_3 : Ro = 2 : 1 : 1.5$, corresponding to the formula $R_4''R_2'''Si_3O_{13}$.——Professor A. H. Chester[3] has recently communicated some notes on the chemical composition of a few obscure American minerals. *Fuchsite* from Aird Island, in Lake Huron, occurs in small layers and masses in a crystallized dolomite. According to Professor Chester's analysis it contains:

SiO_2	Al_2O_3	Cr_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	H_2O
45.49	31.08	3.09	trace	0.51	3.36	9.76	0.90	5.85

A pink celestite from Landsville, Oneida County, N. Y., yielded results corresponding to a mixture of 84 per cent. $SrSo_4$, 11 per cent. $BaSo_4$, and 5 per cent. $CaSo_4$. The mineral has been called *baryto-celestite*, but Professor Chester considers it more probably an isomorphous mixture of the three carbonates. In addition to the analyses given above, there are in the paper quite a number of new analyses reported, the most interesting being those of *okenite*, *scorodite*, *brochantite*, and *zinkenite*.——Igelström[4] reports the existence of a manganiferous *vesuvianite* with 4.72 per cent. of MnO.

Crystallographic News.—Chas. O. Trechman[5] describes crystals of barite from Addiewell in Midlothian, England. They are found in small brilliant crystals covering rhombohedra of pearl spar and the dull faces of an older genera of barite. The new forms detected upon them are $7\check{P}\infty$, $\frac{3}{8}\bar{P}\infty$, $\hat{P}\frac{4}{3}$, $\frac{3}{4}\bar{P}\frac{3}{2}$, $\frac{2}{3}P\bar{\frac{}{2}}$, and $\frac{1}{5}\bar{P}\frac{11}{5}$, $\breve{a} : \bar{b} : c' = .8152 : 1 : 1.3136$.——The examination by Hussak[6] of fluorite crystals from various localities, with reference to the question of optical anomalies, has revealed nothing definite in regard to the anomalous action in this case. He finds, however, that the structure of the mineral corresponds to the orthorhombic symmetry, with the axis of least elasticity normal to one of the cubic faces.——Mr. H. A. Miers[7] mentions orthoclase twins from the augite andesite of Kilimanjaro, in which the composition face (as well as the twinning plane) is the orthopinacoid. The crystals are bounded by the planes ∞P, $2\bar{P}\infty$, $\infty\grave{P}\infty$, and oP.

[1] Zeits. d. deuts. Geol. Ges., 1875, p. 515.
[2] Zeits. f. Kryst., xii. p. 588.
[3] Amer. Jour. Sci., April, 1887, p. 284.
[4] Bul. d. l. Soc. Fr. d. Min., ix. p. 22.
[5] Min. Mag., Dec. 1886, p. 49.
[6] Zeits. f. Kryst., xii. p. 552.
[7] Min. Mag., July, 1886, p. 10.

Miscellaneous.—Fremy[1] has succeeded in obtaining small well-colored crystals of ruby by subjecting to a red heat a mixture of alumina and minium, and also by heating to a high temperature equal weights of alumina and barium fluoride. In both cases the color was produced by the addition of small quantities of potassium bi-chromate.——Measurable crystals of quartz have been produced[2] by heating an enclosed dialysed solution of silica to a temperature of 320°. The crystals, ½ mm. in length, possessed the forms R, —R, ∞R, and in two cases $+\frac{2P2}{4}$. Tridymite was obtained by fusing pieces of very acid rocks with the powder of basalts and melaphyres.——A concretion of coarse tourmaline pegmatite in the tourmaline granite near Pisek, Bohemia, contains pseudomorphs[3] of pyrite after tourmaline.——The rare mineral langite has been found by Von Foullon[4] forming the cement of a breccia in Pockwerke, Garnstein.

ENTOMOLOGY.[5]

Observations on the Female Form of Phengodes laticollis Horn.—Entomologists will remember the interest taken, about one year ago, in the discovery that the female form of a Lampyrid[6] (*Zarhipis riversi*) was larva-like, and that the three stages—larva, pupa, and adult—differed but little. On the night of September 27, 1886, a larviform, luminous beetle was collected on one of the walks of the campus of the University of North Carolina.

FIG. 1.—*Phengodes laticollis*, showing luminosity.

Pupa State.—As the insect cast its skin only once—in the spring of 1887—after coming into my possession, this must represent its pupa state.

Description.—Length when crawling, two and three-fourths inches; width, three-eighths inch. Flattened, larviform, luminous; composed of twelve segments (exclusive of the head), tapering gently behind, and more decidedly on the three anterior segments. Chitinous plates on dorsum blackish-brown, the second to eleventh inclusive with a pair of large, light-brown, oval spots. Anal plate light brown, except a median band of blackish-brown, convex behind. First plate light brown, except a median irregular and two lateral blackish-brown spots. Below each stigmata, on the fourth to eleventh segments inclusive, are two longitudinal folds, the anterior half of each fold

[1] Comptes Rendus, civ., 1887, p. 737.
[2] Chrustchoff, Neues Jahrb. f. Min., etc., 1887, i. p. 205.
[3] E. Döll, Verh. k. k. geol. Reichs., 14, p. 350.
[4] Ib., 1886, p. 464.
[5] This department is edited by Prof. J. H. COMSTOCK, Cornell University, Ithaca, N. Y., to whom communications, books for notice, etc., should be sent.
[6] Am. Nat., xx. 648. See also Ent. Am., iii. 203.